FIG.1A

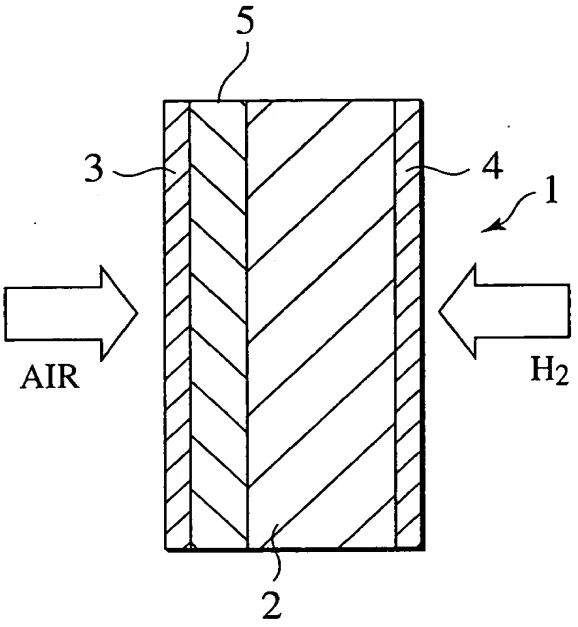
5
3
4
1
AIR
H_2
2

FIG.1B

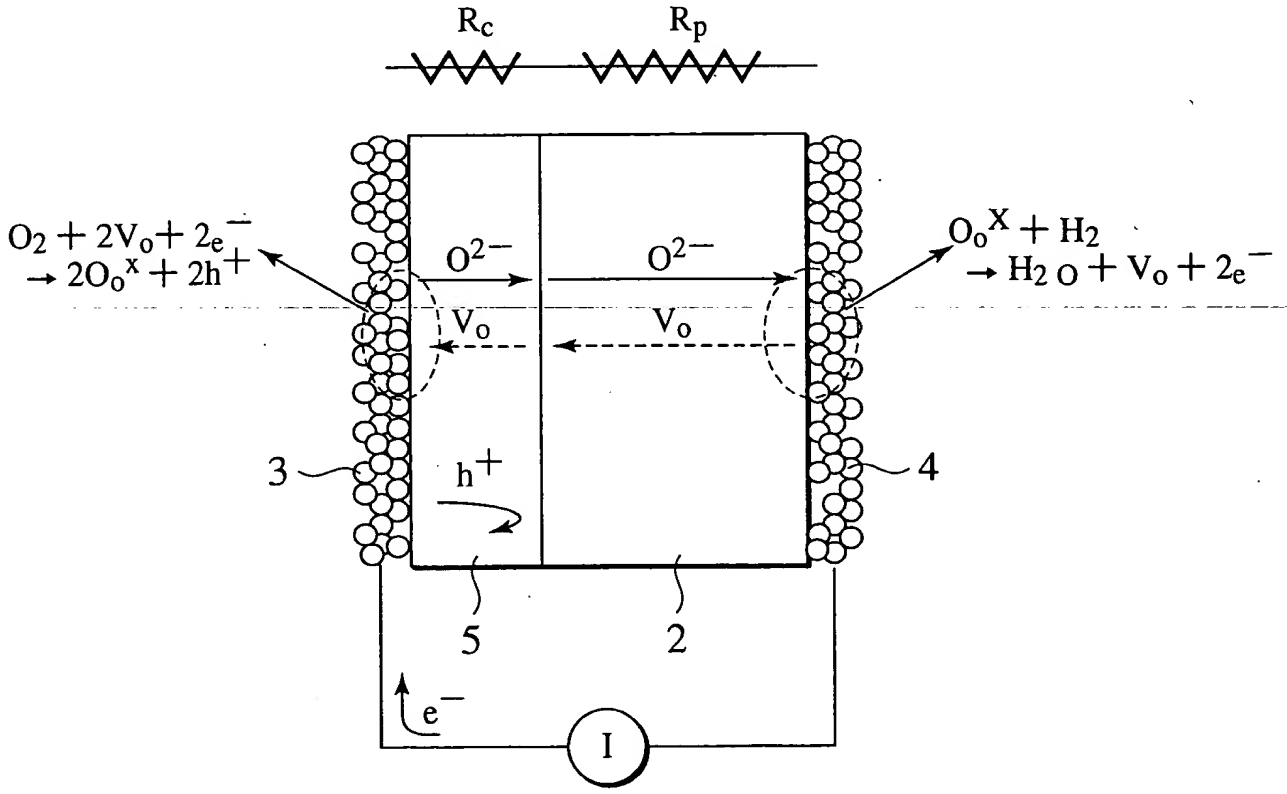
R_c
R_p
$O_2 + 2V_o + 2e^- \rightarrow 2O_o^x + 2h^+$
O^{2-}
O^{2-}
V_o
V_o
$O_o^x + H_2 \rightarrow H_2O + V_o + 2e^-$
3
h^+
4
5
2
e^-
I

FIG.2

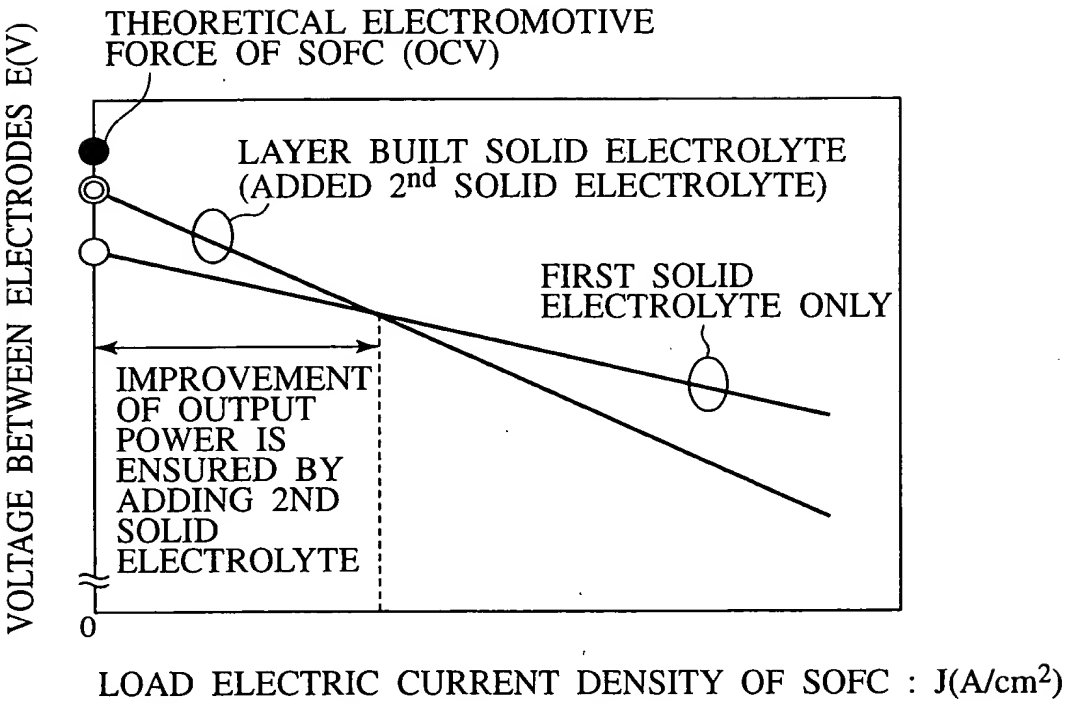
THEORETICAL ELECTROMOTIVE FORCE OF SOFC (OCV)
LAYER BUILT SOLID ELECTROLYTE (ADDED 2nd SOLID ELECTROLYTE)
FIRST SOLID ELECTROLYTE ONLY
IMPROVEMENT OF OUTPUT POWER IS ENSURED BY ADDING 2ND SOLID ELECTROLYTE
VOLTAGE BETWEEN ELECTRODES E(V)
0
LOAD ELECTRIC CURRENT DENSITY OF SOFC : J(A/cm2)

FIG.3A

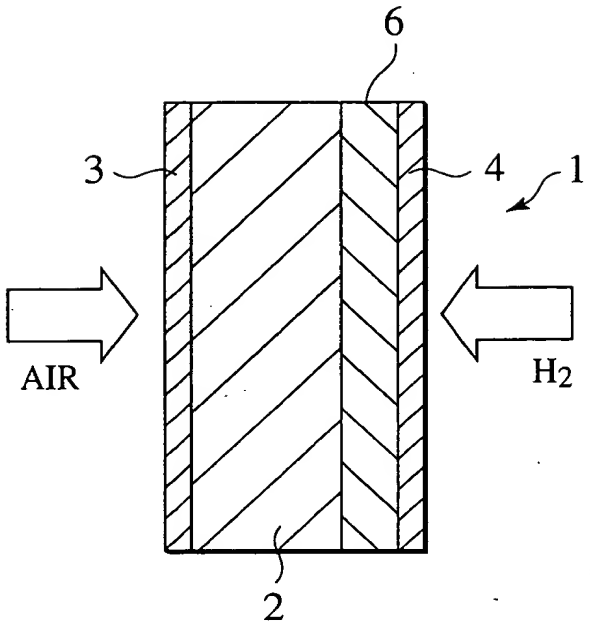

FIG.3B

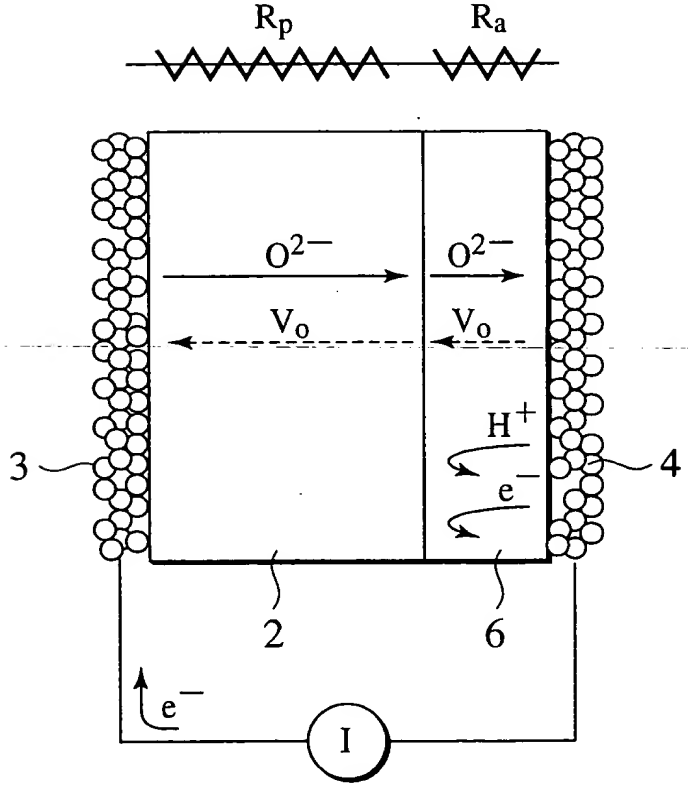

FIG.4A

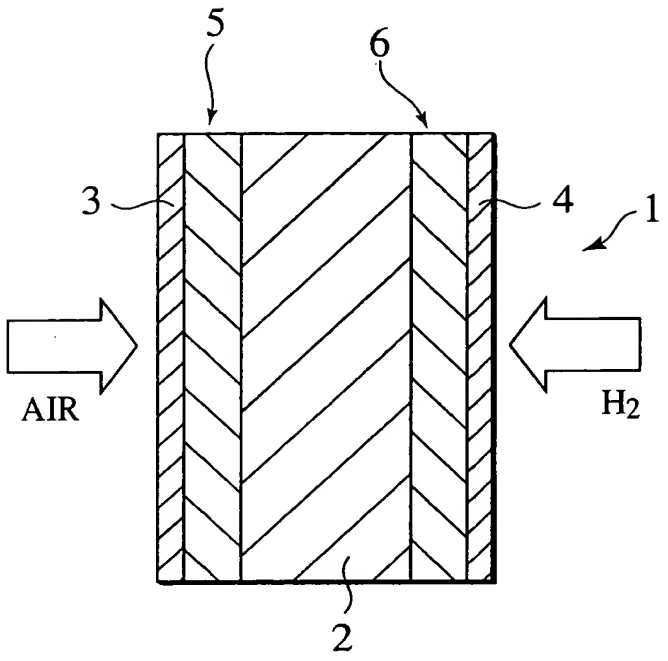

FIG.4B

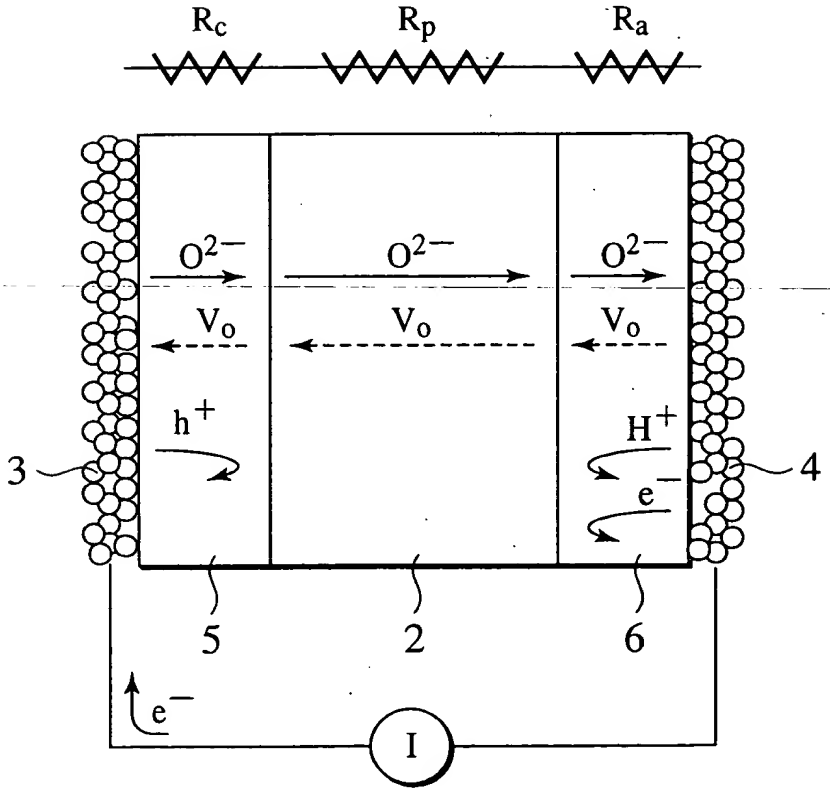

FIG.5

No.	Layer-built solid electrolyte (2nd SE / 1st SE / 3rd SE)	Ion conductivity [σ]	Ion transport number [Toi]
Example 1-a	YSZ / $La_{0.75}$ $Nd_{0.15}$ $Sr_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d}	0.017 S/cm	94%
Example 1-b	YSZ / $La_{0.8}$ $Sm_{0.1}$ $Ba_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d}	0.017 S/cm	94%
Example 2-a	SDC / $La_{0.75}$ $Nd_{0.15}$ $Sr_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d}	0.018 S/cm	94%
Example 2-b	SDC / $La_{0.8}$ $Sm_{0.1}$ $Ba_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d}	0.018 S/cm	94%
Example 3-a	$La_{0.75}$ $Nd_{0.15}$ $Sr_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d} / YSZ	0.017 S/cm	96%
Example 3-b	$La_{0.8}$ $Sm_{0.1}$ $Ba_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d} / YSZ	0.017 S/cm	96%
Example 4-a	YSZ / $La_{0.75}$ $Nd_{0.15}$ $Sr_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d} / YSZ	0.016 S/cm	99%
Example 4-b	YSZ / $La_{0.8}$ $Sm_{0.1}$ $Ba_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d} / YSZ	0.016 S/cm	99%
Example 5-a	SDC / $La_{0.75}$ $Nd_{0.15}$ $Sr_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d} / YSZ	0.017 S/cm	99%
Example 5-b	SDC / $La_{0.8}$ $Sm_{0.1}$ $Ba_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d} / YSZ	0.017 S/cm	99%
Comparative Example a	$La_{0.75}$ $Nd_{0.15}$ $Sr_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d}	0.018 S/cm	91%
Comparative Example b	$La_{0.8}$ $Sm_{0.1}$ $Ba_{0.1}$ $Ga_{0.8}$ $Mg_{0.2}$ O_{3-d}	0.018 S/cm	91%